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C.P. Kelkar

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/763,812
Filing Date: January 23, 2004
Appellant(s): KELKAR ET AL.

Stuart D. Frenkel
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/06/2008 appealing from the Office action mailed 04/15/2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US Patent 6,379,536	04/30/2002	Peters et al.
US Patent 6,214,306	04/10/2001	Aubert et al.
US Patent 6,852,298	02/08/2005	Kelkar et al.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 17-23, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peters et al (US Patent 6,379,536) in view of Aubert et al (US Patent 6,214,306).

With respect to claim 17, Peters discloses a process for NO_x control in an FCC process by using a composition that comprises (i) an acidic oxide support, (ii) an alkali/alkaline earth metal, (iii) a transition metal oxide having oxygen storage capability, and (iv) a transition metal selected from Group I B and/or II B. (See column 1, lines 53-62). Peters further discloses a method of reducing NO_x emission during fluid cracking of a hydrocarbon feedstock into lower molecular weight components, said method comprising contacting a hydrocarbon feedstock with a cracking catalyst at elevated temperature whereby lower molecular weight hydrocarbon components are formed, said cracking catalyst comprising a NO_x reduction component of the invention (See claim 12, column 6, lines 22-40).

Peters invention does not specifically disclose the ratio between the mixed metal (cerium and zirconium) oxides and the remaining components of the NO_x reduction composition. However, the invention does disclose in an embodiment ceria content of 1 wt% based on the silica-alumina support and silver oxide to be 5 wt % of the silica-alumina support (See column 4, lines 34-48).

Peters does not disclose (i) mixed cerium and zirconium oxide in the NO_x reduction composition. However, Peters uses ceria (See column 2, lines 50-52) and further discloses, "Other non-stoichiometric metal oxides having known oxygen storage capability may also be used (Column 2, lines 52-53).

Aubert invention discloses a composition based on zirconium and cerium oxides and its use in NO_x reduction. Aubert further discloses that the composition comprises of (i) zirconium oxide and cerium oxide and it is provided in the form of pure solid solution of cerium oxide in zirconium oxide. (See column 1, lines 30-35). The invention further adds that the composition additionally contains (ii) a doping element chosen alone or a mixture from rare earth metals, alkaline earth metals, particularly lanthanum (See column 2, lines 47-57).

Aubert also discloses that the composition of the invention can be used in the catalysis of various reactions such as hydrodenitrification, cracking, hydrocracking etc. (See column 7, lines 50-60). Aubert discloses that zirconium oxide and cerium oxide today appear as two particularly important and advantageous constituents in multifunctional catalysts (See column 1, lines 10-17).

Since Peters and Aubert both inventions are disclosing a similar NO_x reduction composition in a catalytic cracking process, and also since zirconium is known for its oxygen storage capability, it would have been obvious to one skilled in the art at the time the invention was made to modify Peters invention and add (i) a mixed zirconium oxide and cerium oxide as suggested by Aubert into the composition of Peters for an enhanced NO_x reduction capability. *See In Re Kerkhoven, 626 F.2d 846, 850, 205*

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USPQ 1069, 1072 (CCPA 1980). It would also have been obvious to combine Peters and Aubert inventions and specify the ratio of cerium plus zirconium oxide and other components of the NO_x reduction composition given by Peters.

With respect to claims 18 and 19, Peters invention discloses, "The invention encompasses FCC processes using the NO_x reduction compositions of the invention either as an integral part of the FCC catalyst particles themselves or as separate admixture particles in the FCC catalyst inventory." (Column 1, lines 63-67).

With respect to claim 20, Peters invention discloses, "The said cracking catalyst is fluidized during contacting said hydrocarbon feedstock." (Claim 13, column 6, lines 41-42).

With respect to claim 21, Peters invention discloses, "The method of claim 12 further comprising recovering used cracking catalyst from said contacting step and treating said used catalyst under conditions to regenerate said catalyst." (Claim 14, column 6, lines 43-46).

With respect to claim 22, Peters invention discloses, "The method of claim 12, wherein said hydrocarbon feedstock contains at least 0.1 wt% nitrogen." (Claim 15, column 6, lines 47-48).

With respect to claim 23, Peters invention does not disclose cerium and zirconium oxide contents.

Aubert discloses, “ Expressed in the form of oxides, the compositions according to the invention generally exhibit a Zr/Ce atomic ratio equal to or greater than 1.” (Column 3, lines 10-15). “According to other embodiment of the invention, the cerium proportion can be at most 20%.” (Column 3, lines 26-28). Thus, as discussed under claim 17, it would have been obvious to one skilled in the art at the time the invention was made to modify Peters invention and use a Zr/Ce ratio as claimed, for a better NO_x reduction composition.

With respect to claim 25, Peters invention discloses, “Preferably, the transition metal is selected from the group consisting of Cu, Ag and mixtures thereof.” (Column 2, lines 66-67).

With respect to claims 26 and 27, Peters invention discloses, “The transition metal oxide having oxygen storage capability may be any transition metal oxide having oxygen storage capability similar to that of ceria.” (Column 2, lines 47-49).

Since Peters suggests using any transition metal oxide similar to ceria and Aubert discloses using lanthanum as a doping element in the NO_x reduction composition as discussed under claim 17, it would have been obvious to one skilled in the art at the time the invention was made to modify Peters invention and use lanthanum oxide in place of ceria for similar performance in the NO_x reduction. Aubert

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further discloses, "Mention may more particularly be made of yttrium, lanthanum, neodymium, praseodymium, europium, and samarium." (Column 2, lines 55-57). See *In Re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958).

With respect to claims 28 and 29, Peters invention discloses, "The amount of NOx reduction component in the additive particles is preferably at least 50 wt%." (Column 3, lines 21-23).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 17-23 and 25-29 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,852,298. Although the conflicting claims are not identical, they are not patentably distinct from each other because the '298 claims have an acidic oxide support and only cerium oxide as one component. The present application does not claim an acidic support and claims a mixed oxide of cerium and zirconium. Since the support material does not play an active role in the NO_x reduction process during FCC operation, and since zirconium and cerium appear to be two particularly important and advantageous constituents in multifunctional catalysts for NO_x reduction (See Aubert et al, US Patent 6,214,306; column 1, lines 11-19), it would have been obvious to one skilled in the art at the time the invention was made to modify the '298 claims to eliminate the acidic oxide support and include zirconium with cerium for an enhanced NO_x reduction.

(10) Response to Argument

In the Argument on page 4 (last paragraph) the Appellant argues,

"Essentially the Examiner is stating that ceria and a mixed oxide of cerium and zirconium, are equivalent and/or the broad suggestion that the solid solution of cerium oxide and zirconium oxide in Aubert would have known advantages in removing NO_x in an FCC process. It is these latter conclusions, explicit or implied by the Examiner over which the Appellants strongly disagree. There is no suggestion in any of the applied references that ceria and a mixed oxide of cerium and zirconium are equivalent. More importantly, Aubert does not disclose the advantages that Appellants have found using a mixed oxide of cerium and zirconium in an FCC process for NO_x reduction. While Aubert discloses that his cerium and zirconium mixed oxide or solid solution can be used in a wide variety of catalytic operations, the patent does not otherwise suggest that this material could be a replacement for or in addition to ceria in a NO_x

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reduction FCC catalyst as in Peters. Importantly, Appellants have found that the mixed oxide of cerium and zirconium yields improved stability in FCC processing over ceria or zirconia alone”.

The Appellant’s argument is not persuasive because the examiner does not state that ceria and a mixed oxide of cerium and zirconium are equivalent. Peters clearly discloses, “The transition metal oxide having oxygen storage capability may be any transitional metal oxide having oxygen storage capability similar to that of ceria. Preferably, at least a portion of the oxygen storage oxide is ceria. Other non-stoichiometric metal oxides having known oxygen storage capability may also be used (See column 2, lines 47-53). Aubert discloses, “Multifunctional catalysts is understood to means catalysts capable of carrying out not only oxidation, in particular of carbon monoxide and hydrocarbons present in the exhaust gases, but also reduction, in particularly of nitrogen oxides also present in these gases (“three way” catalysts). Zirconium oxide and cerium oxide today appear as two particularly important and advantageous constituents in this type of catalyst” (Column 1, lines 10-18). Obviously, cerium oxide and zirconium oxide are important constituents of a NO_x removal composition. Thus, it would have been obvious to one skilled in the art at the time of invention to modify Peters invention and use a mixture of cerium oxide and zirconium oxide for enhanced NO_x removal.

It is to be noted that the unexpected result is not commensurate with what is claimed. It is also to be noted that the combined teaching of Peters and Aubert disclose a catalyst composition similar to the Appellant’s claimed catalyst. Thus, the catalyst of the prior art should necessarily have all the advantages of the Appellant’s catalyst.

In the Argument on page 5 (paragraph 1) the Appellant argues,

“It is Appellants position that while mixed oxides of cerium and zirconium with other optional oxides or rare earths have found extensive use in automotive exhaust catalysts, the stability which Appellants have found in FCC processing has not been known prior to this invention, and is certainly not suggested in the broad recitation of possible useful catalysis processes disclosed in Aubert. Aubert does not remotely suggest the results which are shown in Table 1 of the present application. Accordingly, the use of a cerium/zirconium mixed oxide as a substitute for ceria or as an additive in the NO_x reduction catalyst of Peters yields results which are unexpected from a reading of the applied art. The Examiner has simply ignored the improved and unexpected results which have been found in a catalyst for the specific claimed FCC environment. It is believed that the claimed method of reducing NO_x emissions utilizing the claimed catalyst yields results which are not expected from the applied prior art either singularly or in combination”.

The Appellant's argument is not persuasive because Peters discloses use of cerium oxide in FCC process and further discloses that transition metal oxides other than cerium oxide, having similar oxygen storage capability may also be used (See Peters, column 1, lines 53-62; column 2, lines 47-53). It is to be noted that zirconium oxide is another transition metal oxide with oxygen storage capability similar to cerium oxide. Aubert discloses use of cerium oxide and zirconium oxide in a “three way” catalyst for NO_x removal in different processes including cracking and hydrocracking (See Aubert, column 1, lines 10-17; column 7, line 57). Thus, the combined teachings of Peters and Aubert clearly indicate use of cerium oxide and zirconium oxide in NO_x removal in a FCC process and the catalyst disclosed in Aubert invention will inherently have all the claimed advantages including results shown in Table 1. The unexpected result is not commensurate with what is claimed, as discussed earlier.

In the Argument in paragraph bridging page 5 and 6, the Appellant argues,

“The Examiner argues that there is no equivalence between ceria as in Peters and the ceria-zirconia mixed oxide of Aubert, but still concludes that one skilled in the art would modify Peters and use a mixture of cerium oxide and zirconium oxide for enhanced NOx removal. The Examiner relies on Aubert's discussion of the use of the claimed mixed oxide for NOx removal in "three way" auto exhaust catalysts. The Aubert patent is not at all specifically concerned with NOx reduction. The patent states in a paragraph at column 7, lines 50-63 that the catalytic system has a great many applications and absurdly lists every catalytic process imaginable where ceria-zirconia can be used. While this list may suggest an "obvious to try" standard, one of ordinary skill in the catalyst art would have no way of predicting how the mixed oxide would perform in any of the listed processes. There is no specific reference in Aubert to NOx reduction in an FCC process wherein the mixed oxide of cerium and zirconium has improved stability over ceria or zirconia alone, as shown in Table 1 of the present application”.

The Appellant's argument is not persuasive because the examiner is neither arguing nor concluding the equivalence between ceria as in Peters and ceria-zirconia mixed oxide of Aubert. Peters uses ceria for NOx control in FCC and further discloses that other similar oxides can be used, as discussed above. Aubert uses ceria-zirconia mixed oxide for NOx control in different processes including cracking and hydrocracking, as discussed earlier. Aubert's disclosure at column 7, lines 50-63 is not "absurd listing" and does not suggest "obvious to try". It is the examiners position that the combined teaching of Peters and Aubert disclose a catalyst composition similar to the Appellant's claimed catalyst. Thus, the catalyst of the prior art should necessarily have improved stability similar to the Appellant's catalyst.

In the Argument on page 6 (paragraph 2), the Appellant argues,

“The use of a mixed oxide of cerium and zirconium for "three way" automotive catalysts is not disputed by Appellants. In fact, at page 5, lines 8-15 of the instant specification, it is specifically stated that mixed oxides of cerium and zirconium, with other optional oxides of rare earths, have found extensive use in automobile exhaust applications. The gaseous environment of the automobile exhaust is not remotely the same as the mixed liquid and gaseous environment and substantially harsher conditions of temperature and pressure in FCC processing of a hydrocarbon feed stream. What Aubert does not disclose or suggest is that under the harsh FCC conditions, the ceria-zirconia solid solution will yield improved stability as found by Appellants relative to ceria alone, such as in the primary reference to Peters. The Examiner has dismissed this argument as non-persuasive indicating that the combined teachings of Peters and Aubert will inherently have all the claimed advantages shown in Table 1. The use of inherency in a combination of references is improper since once the combination is suggested, the combination will always yield the results found, and which are not otherwise disclosed or suggested in the applied art prior to the suggested combination. It is the results shown in Table 1 which are unexpected and which have been found by Appellants only, not by Peters and not by Aubert. Accordingly, the combination of ceria and zirconia of Aubert for replacing the ceria of Peters yields an unexpected result, which is the capstone of unobviousness”.

The Appellant's argument is not persuasive because Aubert discloses the use of mixed ceria-zirconia catalyst in different processes, including cracking (which does not exclude FCC) (See column 7, line 57). It is to be noted that the combined teaching of Peters and Aubert disclose a catalyst composition similar to the Appellant's claimed catalyst and therefore, should necessarily have similar characteristics as disclosed in Table 1 of the specifications.

In the Argument in paragraph bridging page 6 and 7, the Appellant argues,

“The Examiner appears to further argue that the steaming conditions used to generate the data for aforementioned Table 1 is suggested in Aubert, which discloses typical steps involved in making the catalyst composition including thermal hydrolysis, washing, drying, and calcining. These typical catalyst forming steps are not remotely the same or equivalent to the steaming steps used in Table 1 to simulate catalyst aging in FCC processing. Accordingly, it is again stated that the secondary reference to Aubert simply does not suggest the improved stability during FCC processing that the Appellants have found using a mixed oxide of cerium and zirconium with respect to ceria used in the primary reference”.

The Appellant's argument is not persuasive because catalyst forming steps are not part of the claim. Additionally, Peters and Aubert disclose typical steps involved in making the catalyst composition (See Peters: column 3, lines 40-67; column 4, lines 1-32; Aubert: column 3, lines 48-67; column 4, lines 1-67; column 5, lines 1-67; column 6, lines 1-36). Thus, it is expected that the combined catalyst from Peters and Aubert inventions should necessarily be similar to the Appellant's catalyst and therefore, should necessarily have similar improved stability as cited by the Appellant.

In the Argument on page 7 (paragraph 3), the Appellant argues,

“The instant claims are not at all claiming the same subject matter as claims 1-9 of U.S. 6,852,298. While the '298 patent and the instant claims are directed to reducing NO_x emissions in an FCC process, the catalyst compositions for doing so are different. In the '298 patent, a mixture of cerium oxide and an oxide of a lanthanide series element other than ceria is claimed and the ratio of the cerium oxide to the other lanthanide oxide is specifically set forth. The presently claimed invention is not directed to ceria but is directed to a solid solution or a mixed oxide of cerium and zirconium. Data in the application

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clearly indicates an improvement of the mixed oxide of cerium and zirconium over ceria alone.

Accordingly, it would not be obvious to substitute a mixed oxide of cerium and zirconium for the ceria alone of the patent. Inasmuch as the claimed invention of the present application and the '298 patent are directed to the use of different compositions, and inasmuch as Appellants have shown unexpected results with respect to a mixed oxide of cerium and zirconium relative to ceria alone, the obviousness type double patenting rejection is simply improper. The Examiner argues that the ratio of lanthanide element to ceria could be modified so that the lanthanide element is negligible. The Examiner improperly relies on the specification of the '298 patent to draw such a conclusion. The fact remains that the claims of the '298 patent do not suggest a ceria-zirconia mixed oxide and instead require a specific ratio of ceria to other lanthanide, which ratio is not part of the instant claimed invention".

The Appellant's argument is not persuasive because data in the application clearly indicating an improvement of the mixed oxide of cerium and zirconium over ceria alone is not commensurate with the claimed invention which also includes a transition metal from Group I B and II B.

In any event, the examiner notes that beneficial use of cerium oxide and zirconium oxides together for NO_x reduction as taught by Aubert (See column 1, lines 10-17). Appellant's have not evidenced anything unexpected to overcome the *prima facie* case of obviousness set forth above when including a transition metal from Group I B and II B in addition to the well known combination of cerium and zirconium oxide for the NO_x reduction.

It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from

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their having been individually taught in the prior art.” *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

Patent ‘298 also discloses that the ratio of cerium oxide to the oxide of a lanthanide series element other than ceria could be as high as 500:1 (See column 4, lines 39-41). Ceria in the composition is from 1-25 parts per 100 parts of support (See column 4, line 18-25). Obviously, the lanthanide element other than ceria could be negligible as compared to ceria in the final catalyst composition. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify patent ‘298 claims not to include the other lanthanide series element because of its insignificant amount in the final catalyst composition.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/PREM C SINGH/

Examiner, Art Unit 1797

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